Amendments to the Claims

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims

1. (Withdrawn) A power coupling device for coupling power to a rotating member, said power coupling device comprising:

a. a primary magnetic core defining a first recess;

b. a secondary magnetic core defining a second recess and disposed adjacent said primary magnetic core;

wherein said primary and secondary cores are arranged so as to form an air gap therebetween, said air gap permitting relative rotation of said cores about a common axis of rotation; and

c. a primary conductive winding disposed within said first recess and a secondary conductive winding disposed within said second recess;

wherein at least one of said primary and said secondary windings comprises a fractional turn winding.

2. (Withdrawn) A power coupling device in accordance with claim 1, wherein said fractional turn winding is equal to a single turn winding multiplied by a factor N1 / N2, where N1 and N2 are nonzero integers.

3. (Withdrawn) A power coupling device in accordance with claim 1, wherein said power coupling device is adapted for coupling power to said rotating member at a plurality of

voltage levels, said voltage levels having a magnitude equal to N1 / N2 times a single turn voltage, where N1 and N2 are nonzero integers.

4. (Withdrawn) A power coupling device in accordance with claim 1, wherein said first and second recesses are substantially annular.

5. (Withdrawn) A power coupling device in accordance with claim 1, wherein said primary core and said secondary core are situated concentrically with respect to each other about said common axis of rotation, and wherein said air gap extends radially between said primary core and said secondary core.

6. (Withdrawn) A power coupling device in accordance with claim 5, wherein said air gap has a substantially cylindrical configuration, and is situated concentrically with respect to said common axis of rotation.

7. (Withdrawn) A power coupling device in accordance with claim 1, wherein said primary core and said secondary core have substantially the same dimensions, and wherein said primary core and said secondary core are situated side by side with said air gap extending axially therebetween.

8. (Withdrawn) A power coupling device in accordance with claim 1, wherein at least one of said primary and secondary cores have a substantially semi-toroidal configuration.

9. (Withdrawn) A power coupling device in accordance with claim 1, wherein at least one of said primary core and said secondary core comprises a plurality of individual ferrite core elements disposed adjacent to each other.

10. (Withdrawn) A power coupling device according to claim 9, wherein said plurality of ferrite core elements are arranged in a substantially annular configuration.

11. (Withdrawn) A power coupling device in accordance with claim 10, wherein each of said plurality of individual ferrite core elements have a substantially U-shaped configuration.

12. (Withdrawn) A power coupling device in accordance with claim 3, wherein said fractional turn winding comprises metallic foil.

13. (Withdrawn) A power coupling device in accordance with claim 3, wherein N1 is less than N2 and each of said plurality of voltage levels has a magnitude less than a single turn voltage.

14. (Withdrawn) A power coupling device in accordance with claim 1, wherein said primary and secondary cores have one of a substantially U-shaped cross-section, and a substantially C-shaped cross-section.

15. (Withdrawn) A power coupling device in accordance with claim 1, further comprising a first conductive shield surrounding said primary core and a second conductive shield surrounding said secondary core, said conductive shields being adapted to cancel out the oscillating magnetic fields that are formed contiguous to the outer surface of said cores when a current is passed through one or more of said windings.

16. (Withdrawn) A power coupling device in accordance with claim 15, wherein said first and second conductive shields are annular metallic shells having a substantially semi-toroidal configuration.

17. (Withdrawn) A power coupling device in accordance with claim 16, wherein said annular shells are substantially continuous.

18. (Withdrawn) A power coupling device in accordance with claim 17, wherein said first and second conductive shields are configured to support a current that is substantially equal in magnitude and opposite in direction to the net current in said conductive windings.

19. (Withdrawn) A power coupling device in accordance with claim 1, further comprising a support structure for supporting said cores and said windings.

20. (Withdrawn) A power coupling device in accordance with claim 19,

wherein said support structure comprises conductive shields surrounding said primary core and said secondary core for cancelling out oscillating magnetic fields that are formed contiguous to the outer surface of said cores when a current is passed through one or more of said windings; and

wherein said conductive shields are annular metallic shells having a substantially semi-toroidal configuration.

21. (Withdrawn) A power coupling device in accordance with claim 1, wherein said primary and secondary cores are made of a magnetically permeable material, including but not limited to ferrite, silicon iron, nickel ion alloy, stainless steel, and cobalt iron alloy.

22. (Withdrawn) A power coupling device in accordance with claim 1, wherein said second recess is disposed opposite said first recess and spaced apart therefrom.

23. (Withdrawn) A system including a power coupling device adapted to transmit power at a plurality of voltage levels, said system comprising:

a. a static member;

b. a rotatable member coupled to said static member;

c. a power source; and

d. an inductive power coupling device responsive to said power source for transmitting power from said power source to at least one of said static member and said rotatable member, said inductive power coupling device comprising

i. a primary magnetic core defining a first recess;

ii. a secondary magnetic core defining a second recess;

wherein said primary and secondary cores are disposed so as to form an air gap therebetween, said air gap permitting relative rotation of said cores about a common axis of rotation;

iii. a primary conductive winding disposed within said first recess and a secondary conductive winding disposed within said second recess;

wherein at least one of said primary and said secondary windings comprises a fractional turn winding.

24. (Withdrawn) A system in accordance with claim 23, wherein said system is a CT scanner, said stationary member comprises a static gantry in said CT scanner, and said rotatable member has an x-ray source mounted at a distal end thereof.

25. (Withdrawn) A system in accordance with claim 23,

wherein said power coupling device is adapted for transmitting power at a plurality of voltage levels; and

wherein said fractional turn winding is equal to a single turn winding multiplied by a factor N1 / N2, and said voltage levels having a magnitude equal to N1 / N2 times a single turn voltage, where N1 and N2 are nonzero integers.

26. (Withdrawn) A system in accordance with claim 25, wherein N1 is less than N2, said plurality of voltage levels each has a magnitude less than a single turn voltage, and said fractional turn winding provides a low power tap for supplying power at a reduced voltage.

27. (Withdrawn) A system in accordance with claim 26, wherein said fractional turn winding comprises metallic foil.

28. (Withdrawn) A system in accordance with claim 26, wherein said fractional turn winding provides a low power tap for supplying power at a reduced voltage to said static member.

29. (Withdrawn) A system in accordance with claim 26, wherein said fractional turn winding provides a lower power tap for supplying power at a reduced voltage to said rotatable member.

30. (Withdrawn) A power coupling device in accordance with claim 1, further comprising a CT scanner including a rotatable gantry, wherein one of the cores and corresponding conductive winding is rotatable with the gantry.

31. (Withdrawn) A system in accordance with claim 23, wherein the system is a CT scanner, the rotatable member is a gantry, and one of the cores and corresponding conductive winding is rotatable with the gantry.

32. (Currently Amended) A power coupling device for coupling power to a rotating member, said power coupling device comprising:

a. a primary magnetic core ~~including~~ <u>and</u> a primary winding;

b. a secondary magnetic core ~~including~~ <u>and</u> a secondary winding;

wherein said primary and secondary cores are arranged so as to form an air gap therebetween, said air gap permitting relative rotation of said cores about an axis of rotation while allowing power

to be transferred across the air gap~~, and wherein at least one of said primary and said secondary windings comprises a fractional turn winding~~;

c. conductive shielding ~~configured as~~ including at least two continuous, circular ~~half~~ toroidal ~~shells~~ sections, each ~~shell~~ section ~~surrounding~~ being positioned so as to be adjacent a respective one of the primary and secondary cores except for a portion adjacent the air gap, wherein when power is transferred across the air gap, oscillating magnetic fields will induce currents in the shielding, which induced currents tend to cancel the oscillating magnetic fields in a region outside the shielding.

33. (Previously Presented) A power coupling device in accordance with claim 32, wherein the conductive shielding is configured so as to create a substantially continuous conductive path around the axis of rotation for conducting the induced currents.

34. (Previously Presented) A power coupling device in accordance with claim 32, wherein the conductive shielding includes an annular shell providing an electrical path extending substantially continuously around the axis of rotation adjacent each core.

35. (Previously Presented) A power coupling device in accordance with claim 32, wherein the conductive shielding includes continuous, annular metallic shells having substantially semi-toroidal shapes configured to provide substantially conductive paths disposed adjacent the cores.

36. (Previously Presented) A power coupling device in accordance with claim 32, wherein the conductive shielding includes a conductive shell for each of the cores, each shell including at least a portion having a C-shaped cross section with a corresponding portion of a core disposed therein.

37. (Previously Presented) A power coupling device in accordance with claim 32, wherein each of the primary and secondary cores is configured as an annular conductive shell.

38. (Previously Presented) A power coupling device in accordance with claim 32, wherein the conductive shielding includes a continuous circular shell disposed about the axis of rotation surrounding each core with the exception of the air gap.

39. (Previously Presented) A power coupling device in accordance with claim 38, wherein the circular shell includes at least two segments, each segment being in the form of a continuous ring.

40. (Previously Presented) A power coupling device in accordance with claim 39, wherein the segments of each shell are electrically connected to one another.

41. (Previously Presented) A power coupling device in accordance with claim 32, wherein the shielding is of a predetermined thickness, and the air gap is less than one-half the predetermined thickness.

42. (Previously Presented) A power coupling device in accordance with claim 32, wherein the power transfer device forms a part of a CT scanner.

43. (Previously Presented) A power coupling device in accordance with claim 42, further including an X-ray tube arranged to rotate with the secondary magnetic core and receive power transferred across the air gap.

44. (Currently Amended) A rotary transformer system comprising:

a. a primary transformer portion including a primary winding;

b. a secondary transformer portion including a secondary winding;

wherein the first and second transformer portions are configured so as to rotate relative to one another; and

electrically conductive shielding as two continuous, circular half toroidal shells, each shell surrounding a respective one of the primary and secondary transformer portions except for a portion adjacent the air gap, wherein the shielding is arranged so as to substantially cancel oscillating magnetic fields generated when power is transferred between the primary transformer portion and the secondary transformer portion~~, and wherein at least one of said primary and said secondary windings comprises a fractional turn winding~~.

45 (Previously Presented) A rotary transformer system in accordance with claim 44, wherein the primary transformer portion and the secondary transformer portion each comprises a transformer core and an electrically conductive transformer winding.

46. (Previously Presented) A rotary transformer system in accordance with claim 44, wherein the electrically conductive shielding conducts current generated in response to the oscillating magnetic fields when power is transferred between the primary and secondary transformer portions so as to substantially cancel the oscillating fields in a region outside the shielding.

47. (Previously Presented) A rotary transformer system in accordance with claim 44, wherein the primary transformer portion is stationary and the secondary transformer portion rotates relative to the primary transformer.

48. (Previously Presented) A rotary transformer system in accordance with claim 44, wherein the primary and secondary transformer portions are spaced relative to one another so as to create an air gap therebetween.

49. (Previously Presented) A rotary transformer system in accordance with claim 44, wherein the conductive shielding is configured so as to create a substantially continuous conductive

path for induced currents which in turn tend to cancel the oscillating magnetic fields in the region outside the shielding.

50. (Previously Presented) A rotary transformer system in accordance with claim 44, wherein the first and second transformer portions are configured so as to rotate relative to one another around an axis of rotation, and the conductive shielding includes at least one annular shell extending substantially continuously around the axis of rotation adjacent each of the transformer portions.

51. (Previously Presented) A rotary transformer system in accordance with claim 50, each annular shell has a substantially semi-toroidal shape disposed adjacent the corresponding transformer portion.

52. (Previously Presented) A rotary transformer system in accordance with claim 44, wherein the conductive shielding for each of the transformer portions includes at least a portion having a C-shaped cross section.

53. (Previously Presented) A rotary transformer system in accordance with claim 44, wherein the primary and secondary transformer portions are spaced from one another so as to create an air gap therebetween, and the conductive shielding includes a continuous circular shell surrounding each transformer portion with the exception of the air gap.

54. (Previously Presented) A rotary transformer system in accordance with claim 53, wherein each shell is a circular shell surrounding a respective transformer portion with the exception of the air gap, each shell including at least two segments, and each segment being in the form of a continuous ring.

55. (Previously Presented) A rotary transformer system in accordance with claim 54, wherein the segments of each shell are electrically connected to one another.

56. (Previously Presented) A rotary transformer system in accordance with claim 44, wherein the shielding is of a predetermined thickness, and the air gap is less than one-half the predetermined thickness.

57. (Previously Presented) A rotary transformer system in accordance with claim 44, wherein the rotary transformer system forms a part of a CT scanner.

58. (Previously Presented) A rotary transformer system in accordance with claim 57, further including an X-ray tube arranged to rotate with the secondary transformer portion so as to receive power transferred between the primary transformer portion and the secondary transformer portion.